PHYSICS 106 (Spring 2004)
EXAM 1 – VERSION A

NAME_____ RECITATION _____

INSTRUCTIONS:

- Please fill in your computer answer sheet filling in the circle on the sheet corresponding to the letters of numbers with a #2 pencil as follows:

  In the NAME grid fill in your last name, leave one blank space, then your first name.

  Write your ID number in the IDENTIFICATION NUMBER section of the sheet.

  Write your recitation section number in the space K,L in the SPECIAL CODES section. The recitation section number should be preceded by a 0 (e.g. section 1 is written as 01).

  Fill in the VERSION of this exam on #101 of the answer sheet.

  In the next fifty minutes you need to answer all 20 questions for 5 points each. For each question, you should indicate in the answer sheet the best choice. Note that the multiple-choice questions on this exam are numbered 1 through 20. Check your answers carefully, making sure your answers are entered under the correct number, as no changes will be made after the exam is turned in. At the end of the exam you will have to hand in your notes, your exam paper and the answer sheet.

- You are allowed to use one page of handwritten notes and a calculator.

1. Your height in meters is close to which of the following numbers?

A) 10^{-2} B) 10^{-1} C) 10^{0} D) 10^{+1} E) 10^{+2}

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2. A 100 kg sack of potatoes falls from an airplane. As the velocity of the falling sack increases, so does the air resistance on it. When the air resistance equals 100 kg, the real acceleration *a* of the sack will be

A. infinite. B. 9.8 m/s^2. C. 9.8 m/s. D. 4.9 m/s^2. E. zero

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3. Your mass is 50 kg. Suppose you are standing on a scale in an elevator which starts Moving up and increases its speed at the rate of 2 m/s every second. What would be the reading on the scale?

A. 600 N B. 500 N C. 400 N D. 100 N E. 0

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4. A quantity which is conserved in the collision of a car and a truck is

A. kinetic energy.
B. nervous energy.
C. momentum of the car.
D. total momentum.
E. momentum of the truck

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5. A child runs at 4.0 m/s and jumps onto a sled, initially at rest. If the child' mass is 36 kg, and if the child and sled slide off together at 3.0 m/s after the collision, the sled's mass is

A. 6 kg. B. 12 kg. C. 27 kg. D. 36 kg. E. 48 kg.

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6. The average force required to accelerate a 0.20-kg ball from rest to 30 m/s in 0.001 s is

   A. 0.006 N
   B. 6 000 N
   C. 30 000 N
   D. 60 000 N
   E. 150 000 N

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7. A wooden block slides down a rough incline. Which of the following statements is true?

   A. The kinetic energy of the block is decreasing.
   B. The gravitational potential energy of the block is increasing.
   C. The mechanical energy of the block is constant.
   D. The mechanical energy of the block is increasing.
   F. The mechanical energy of the block is decreasing.

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8. A 5.0-kg cat runs to the left at 10 m/s and a 10-kg dog runs to the right at 5.0 m/s. The total kinetic energy is

   A. -125 Joule.
   B. +125 Joule
   C. 0 Joule.
   D. 375 Joule.
   E. 500 Joule.

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9. An auto moves 10 meters in the first second of travel, 10 more meters in the next second and 10 meters during the third second. The acceleration of the auto in m/s^2 is

   A. 3.33 B. 9.8 C. 30 D. 10 E. Zero

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10. A car travels a distance of 60 km. For the first 30 minutes it is driven at a constant speed of 60 km/hr. The motor begins to vibrate and the driver reduces the speed to 30 km/hr for the rest of the trip. The average speed for the entire trip is:

    A. 60.0 km/hr.
    B. 53.3 km/hr.
    C. 50.0 km/hr.
    D. 47.5 km/hr.
    E. 40.0 km/hr.

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11. A car is driven between two nearby towns at an average speed of 50 miles/hour. The magnitude of the average velocity of the car

    A. will always be the same as the average speed.
    B. will always be less than the average speed.
    C. will be the same as or less than the average speed.
    D. will be the same as or greater than the average speed.
    E. will always be greater than the average speed.

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12. (Ignore air friction for this problem.) Two identical balls are thrown simultaneously from the top of a very tall cliff. Ball A is thrown downward with an initial velocity of 6 m/s, while ball B is thrown straight upward with an initial velocity of 9.8 m/s. After one second has elapsed, the

    A. acceleration of ball A is upward
    B. velocity of ball B is zero.
    C. the acceleration of ball A is greater than that of ball B.
    D. velocity of ball A is 9.8 m/sec.
    E. acceleration of both balls is zero.

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13. In order to find the depth of a well, you drop a stone into it and time its fall. It hits the water after falling for 2 s. The depth of the well is about

A. 2 m. B. 10 m. C. 20 m. D. 40 m. E. 60 m

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14. A ball is thrown upward with an initial velocity of 20 m/s. It will reach its maximum height in approximately

A. 1 s. B. 1.5 s. C. 2 s. D. 2.5 s. E. 3 s.

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15. A bullet is fired horizontally at a target 20 m away. The velocity of the bullet as it leaves the gun is 100 m/s. How much, approximately, will the bullet drop on its way to the target?

A. 0.1 m. B. 0.2 m. C. 0.3 m. D. 0.4 m E. 0.5 m.

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16. Suppose one's hand exerts a force of 12 N upward on a book weighing 10 N. The reaction to the force of the hand on the book is a force of

A. 10 N exerted by the Earth on the book.
B. 10 N exerted by the book on the Earth.
C. 12 N exerted by the book on the hand.
D. 10 N exerted by the book on the hand.
E. 2 N exerted by the book on the hand.

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17. A crate is acted upon by a net force of 100 N. An acceleration of 5.0 m/s^2 results. The weight of the crate is

A. 20 N. B. 10 N. C. 100 N. D. 200 N. E. 40 N.

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18. An object with a kinetic energy of 50 J is stopped in a distance of 0.01 m. The average force that stops the object is

A. 0.5 N.
B. 50 N.
C. 500 N.
D. 5,000 N.
E. 50,000 N

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19. In figure below, a given force is given F is applied to a rod in several different ways. In which case the torque due to F about the pivot P is greater?

A . 

B. 

C. 

D. 

E 

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20. A boy pulls a wooden box of mass m along a rough horizontal floor at constant sped by means of a force ***P***. The force diagram for the box is shown below. Which of the following must be true, where ***f*** and ***N*** are, respectively, the magnitudes of frictional and normal forces?

A. P > f and N = mg
B. P = f and N = mg
C. P > f and N < mg
D. P = f and N > mg
E. P < f and N = mg